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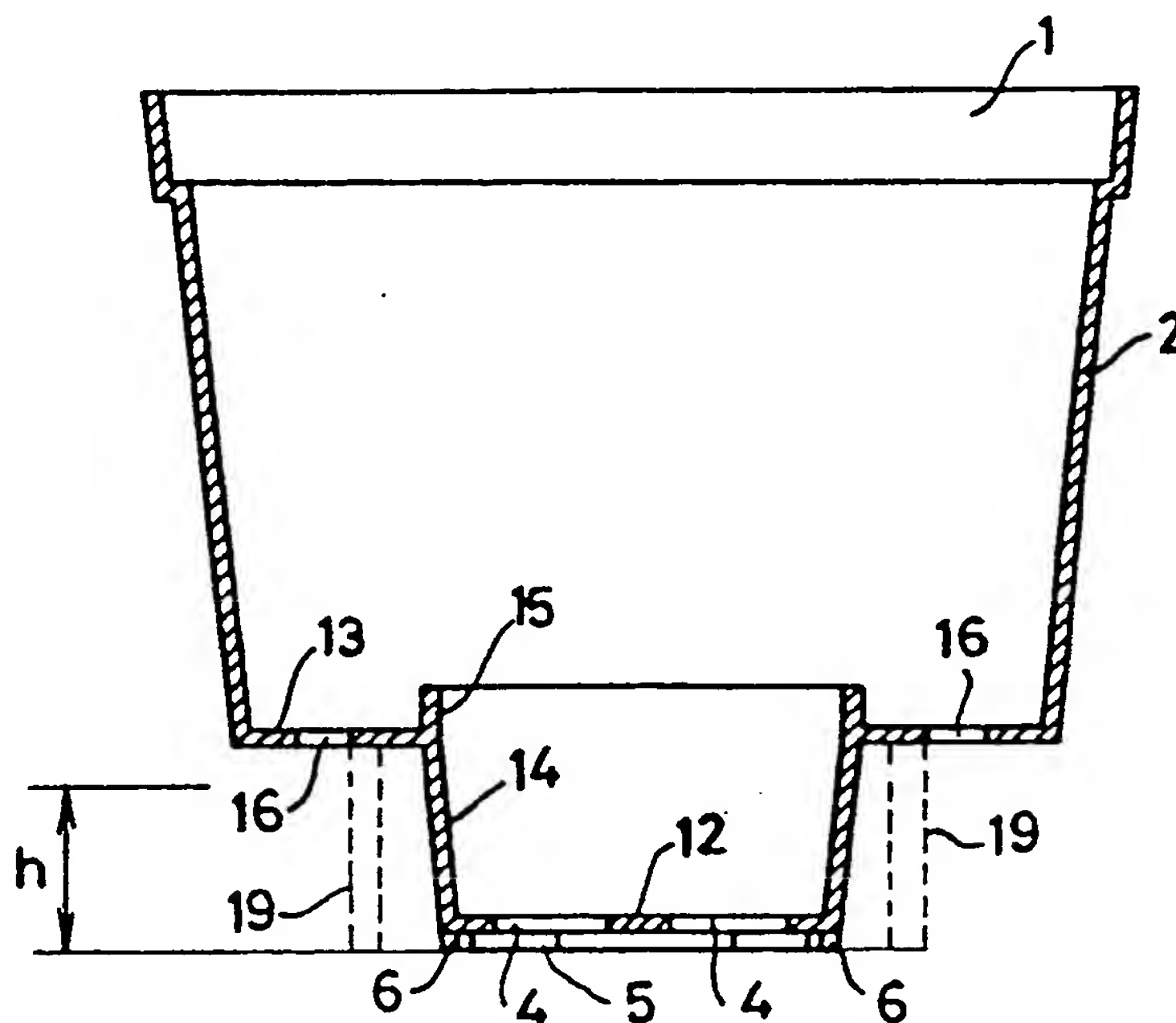
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(21) International Application Number: PCT/NL94/00055 (22) International Filing Date: 3 March 1994 (03.03.94) (30) Priority Data: 9300413 8 March 1993 (08.03.93) NL (71)(72) Applicant and Inventor: VAN DER KNAAP, Nicolaas, Gerardus, Hyacinthus, Maria [NL/NL]; Anthuriumweg 10, NL-2665 KV Bleiswijk (NL). (74) Agent: VAN DER AREND, A., G., A.; Exterpatent B.V., P.O. Box 3241, NL-2280 GE Rijswijk (NL).	(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>	

(54) Title: **PLANT POT, AND INSERT FOR PLANT POT**

(57) Abstract

Plant pot with an interior space (1) bounded by an upright wall (2) and a bottom (3, 12, 13) intended for the accommodation therein of substrate material (8) for a plant (9, 10), in which a lower part of the pot containing the bottom is shaped (5, 6) and provided with holes (4) below a height (h) which corresponds to a maximum irrigation level of a water irrigation system after the pot is placed on a floor (7), in such a way that the holes (4) can allow air and water to pass between the interior space (1) and the space surrounding the pot, while the bottom of the interior space (1) comprises an upper part (13) which extends along the wall (2) and above the maximum irrigation level (h), and a partition (14) which is suitable for essentially holding back the substrate material (8) extends between the upper bottom part (13) and a lower bottom part (3, 12). The upper bottom part (13) can be an integral part of the pot, or can be achieved by an insert (26) placed in the pot.



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Plant pot, and insert for plant pot.

The invention relates to a plant pot with an interior space bounded by an upright wall and a bottom, intended for the accommodation therein of substrate material for a plant, in which a lower part of the pot
5 containing the bottom is shaped and provided with holes below a height which corresponds to a maximum irrigation level of a water irrigation system after the pot is placed on a floor, in such a way that the holes can allow air and water to pass between the interior space and the space
10 surrounding the pot.

A plant pot of the abovementioned type is known in practice. Such a plant pot is used by nurseries, where large numbers of plants are often grown simultaneously, in a so-called flood irrigation system. In this case the plant
15 pots stand on an essentially watertight floor which is bounded by such a raised edge that water can remain between them and on the floor. Such a floor can be a concrete floor provided on the ground, or it can be formed by the bottom of a nursing container placed at a comfortable working
20 height. Where the flood irrigation system is used there is normally no water on the floor: the ebb situation. For watering the plants, so much water is introduced onto the floor that the water level is above holes in a lower part of each plant pot in order to allow water in through the
25 holes. This situation, the flood situation, is maintained for a predetermined period, during which time the substrate material in each plant pot can absorb water through the holes in the bottom of the plant pot. At the end of this predetermined period, the water is drained away from the
30 floor again, so that the ebb situation is reached again, and if there is too much water in the substrate material of any plant pot, it can flow out of the pot through the holes in the bottom of the plant pot. In order to make excess water flow quickly out of the plant pot when returning to
35 the ebb situation, it is known to have raising means for

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placing the bottom of the plant pot relatively high above the floor, but with the abovementioned holes still 2 - 4 cm below the flood level of the water. Such raising means can consist of a relatively high collar formed integrally on the underside of the pot. The flood irrigation system is often used because sprinkling plants from the top has disadvantages, in particular as regards maintaining a certain climate, water distribution and automation.

In all known plant pots, with or without the use of the abovementioned raising means, the roots grow essentially along the inside wall of the plant pot until they are at the bottom of the pot, and the greatest concentration of roots lies in the bottom of the pot.

It has been found that, particularly in winter, a large number of plant varieties can become damaged at the roots if the main concentration of roots at the bottom of the pot is placed regularly under water. The damage can consist of hair roots dying off, in which case entry points for fungi can be produced, as a result of which root rot can occur.

Since during the flood periods the roots in the lower part of the plant pot come regularly into contact with water which is frequently recirculated, and since the water also comes into contact with roots of other plants, there is a real danger of contamination and the spread of nematodes (type of eelworm). In order to prevent root rot and the spread of nematodes often fungicides (to control fungi) and nematicides (to control nematodes) are added to the water. However, the use of fungicides and nematicides is increasingly being seen as harmful to the environment, and it is also a cost-increasing factor in commercial plant growing.

The object of the invention is to eliminate the drawbacks of the known plant pot.

To this end, the plant pot of the type mentioned in the preamble according to the invention is characterized in that the bottom of the interior space comprises an upper part which extends along the wall and above the maximum irrigation level, and in that a partition which is suitable

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for essentially holding back the substrate material extends between the upper bottom part and a lower bottom part. Since the roots grow more easily along the wall of the pot than from there into substrate material, the raised bottom part prevents roots from growing in the direction of the lower bottom part, so that few or no roots will develop above the lower bottom part. This prevents damage from occurring to the roots. Nevertheless, during the flood situation the substrate material above the lower bottom part remains capable of absorbing water through holes present in the lower bottom part. Due to the fact that there are essentially no roots present in the substrate material below the flood level of the water, the flood level can be maintained for longer in order to give the substrate material the opportunity to absorb water, without significant damage to the roots occurring. Since fewer roots are present in the lower part of the pot above the lower bottom part, possible contamination and spread of nematodes will be less, and there will be less need for the use of fungicides and nematicides.

The upper bottom part preferably has a raised part at a distance from the wall above it. This further prevents the roots from growing from the wall above the upper bottom part towards the lower bottom part, which further prevents damage from occurring to the roots.

The upper bottom part preferably has holes, and the lower part of the pot is shaped in such a way that the holes in both the upper bottom part and the lower bottom part can allow air through between the interior space and the space surrounding the pot. This favourably influences the growth of the plant. The holes in the upper bottom part also have the advantage that after the return from the flood to the ebb situation excess water in the substrate material can be drained away through these holes.

Where a known plant pot of the type mentioned in the preamble is used, the upper bottom part can also be achieved by forming the upper bottom part and the partition between the upper and lower parts of the bottom by an insert.

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The invention therefore also relates to such an insert.

The insert has the advantage that it is simple, nestable and cheap to manufacture from plastic. The insert
5 can be manufactured, held in stock separately from known pots and placed in such a pot when required. This also makes the insert economical in use.

Other features and advantages of the invention will emerge from the following explanation with reference to the
10 drawings, in which:

Fig. 1 shows a section of a known plant pot containing substrate material and a part of a plant;

Fig. 2 shows a bottom view of the plant pot of Fig. 1;

15 Fig. 3 shows a section of a first embodiment of a plant pot according to the invention;

Fig. 4 shows a bottom view of the plant pot of Fig. 3;

20 Fig. 5 shows a side view of a supporting means for the plant pot of Fig. 3;

Fig. 6 shows a section of a second embodiment of a plant pot according to the invention;

Fig. 7 shows a bottom view of the plant pot of Fig. 6; and

25 Fig. 8 shows a section of an insert according to the invention for a known plant pot according to Fig. 1.

The known plant pot shown in Figs. 1 and 2 has an interior space 1, which is bounded by an upright wall 2 and a bottom 3. The bottom 3 has holes 4. A collar 5 with
30 openings 6 is provided on the underside of the pot. The pot stands with the collar 5 on a floor 7, which is essentially watertight and can be a concrete floor with a raised edge (not shown), or which can be a bottom of a container which is placed at a comfortable working height.

35 The interior space 1 contains suitable substrate material 8, for example potting compost. A plant, only part of the stem 9 and roots 10 of which is shown (neither in section), is growing in the substrate material 8. In general, the roots 10 grow essentially along the inside of

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the wall 2 of the pot, and particularly in the lower part of the interior space 1 of the pot.

When a flood irrigation system is used, water is introduced periodically onto the floor 7 up to, for example, a maximum height or flood height h . During the flood, water can penetrate into the substrate material 8 through the openings 6 in the collar 5 on the underside of the pot, and through the holes 4 in the bottom 3 of the pot, and the substrate material 8 can absorb the water to above the flood level h . On the return to the ebb situation, excess water from the substrate material 8 can flow back through the holes 4 and the openings 6 and can be drained away together with other water on the floor 7. During the ebb, air can penetrate into the substrate material 8 in the bottom of the pot through the holes 4 and the openings 6, which promotes the growth of the plant.

It has been found that in a large number of plant varieties damage to the roots can occur, in particular in the winter and in the bottom part of the pot, in which the main concentration of roots is situated, and which is regularly under water during flood periods. Fig. 1 shows damaged roots in black, just as they are generally found in reality.

The occurrence of root damage is detrimental to healthy growth of the plant. Furthermore, because a part of the roots is regularly in contact with water which is frequently recirculated and the water also comes into contact with roots of other plants, there is a real danger of contamination and the spread of nematodes. Besides, the use of fungicides (to control fungi) and nematicides (to control nematodes) is increasingly being seen as harmful to the environment, and it is also a cost-increasing factor in commercial plant growing.

The object of the invention is to eliminate the drawbacks connected with the use of the known plant pot.

The first embodiment of the plant pot according to the invention shown in Figures 3 and 4 has an interior space 1, which is bounded by an upright wall 2, a lower bottom part 12 and an upper bottom part 13. The lower

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bottom part 12, which has a smaller diameter than the bottom 3 of the pot of Figs. 1 and 2, like the bottom 3, is provided with holes 4 and has on the underside a collar 5 with openings 6. The function of the holes 4, the collar 5 and the openings 6 of the pot of Figs. 3 and 4 is the same as that of the pot of Figs. 1 and 2.

The lower bottom part 12 is connected to the upper bottom part 13 by way of a partition 14, which is suitable for essentially holding back substrate material present in the interior space 1. The partition 14 can be completely closed, or can have holes, for example oblong holes extending over the height of the partition, and through which air and/or water can penetrate into the substrate material surrounded by the partition 14. If the partition 14 has such holes close to the lower bottom part 12, the bottom 12 can be completely closed, and the collar 5 need not be provided on the underside of the bottom 12.

The upper bottom part 13 is situated above the earlier mentioned maximum water level h. Since the roots of a plant will develop essentially along the inside of the wall 2 and will develop less radially inwards from there, the use of such an upper bottom part 13 will prevent a major part of the roots from developing towards the lower bottom part 12. This ensures that during flood periods a substantial part of the roots does not lie under water, which prevents the occurrence of root rot, contamination and the spread of nematodes, and cuts out the need for the use of fungicides and nematicides.

The plant pot shown in Figs. 3 and 4 has in its interior space 1 on the upper bottom part 13 a raised edge or collar 15, which can be a closed continuation of the partition 14. The collar 15 also helps to prevent the development of roots from the wall 2 over the upper bottom part 13, and from there into the space surrounded by the partition 14.

The upper bottom part 13 can have holes 16 as shown. Through holes 16 air from outside the pot can penetrate into the substrate material in the interior space 1 of the pot, which promotes healthy growth of the plant.

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The holes 16 can also serve to drain away excess water out of the substrate material when the irrigation system returns from a flood situation to an ebb situation.

It is pointed out that the dimensions of the pot shown in Figures 3 and 4 are taken only as an example. However, if the actual dimensions are such that in certain situations, depending on the weight of the substrate material and the plant, the pot would not stand sufficiently stably on the floor, consideration can be given to providing the pot with additional supporting means. Such supporting means can consist of supporting means formed integrally with the pot or supporting means to be connected to the pot.

Fig. 5 shows a side view of an example of supporting means to be connected to the pot of Fig. 3, consisting of a disc 17 with vertical hook elements 18, which can be inserted into the holes 4 of the lower bottom part 12 and then remain inside the pot hooked over the edges of said holes 4. In general, two of such hook elements 18 will be sufficient. Instead of being disposed on a disc 17, such hook elements 18 can also be disposed on a disc of smaller diameter, and with the fingers going out radially therefrom in the plane of the disc. Such supporting means with hook elements 18 can also be designed in such a way that such hook elements grip over edges of holes 16 of the upper bottom part 13.

Although not shown, the supporting means which can be connected to the pot can also consist of a disc with an upright collar which can be slid around the partition 14 and held in place there by friction or by means of complementary bulges and hollows in said collar and the outside of the partition 14.

Supporting means formed integrally with the pot can consist of such a number of vertical pins 19 (shown by dashed lines in Figures 3 and 4) which are formed at such points on the underside of the upper bottom part 16 and the axes of which intersect a circle on which the holes 16 are also centred, and which have a smaller diameter than the holes 16, that pots with such pins 19 can be stacked in

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such a way that the pins 19 project through holes 16 of a lower pot.

Fig. 6 shows a plant pot of the type shown in Fig. 3, without the collar 5 on the underside of the lower bottom part 12, but with a wall 20 formed integrally with an underside of the upper bottom part 13 and of such height that the pot rests by means of the wall 20 on the floor (Fig. 1), and the wall 20 has openings 21 for allowing through water and air. The wall 20 can have holes in the same way as the partition 14. Holes, such as the holes 22, disposed relatively high up in the wall 20, can prevent the pot from floating when the flood irrigation system passes from the ebb situation to the flood situation. The wall 20 forms supporting means formed integrally with the pot. As can be seen in Fig. 6, the wall 20 runs essentially vertically, which facilitates unmoulding of the pots from mould parts during injection moulding. The wall 20 is also disposed staggered at a distance from the wall 2, which improves the stackability of the pots, and the wall 20 can project deeper into a lower pot.

Supporting means formed integrally with the pot can also consist of "fingers" extending downwards in line with the wall 2 from the upper bottom part 13. Since such fingers will be slightly flexible, they do not give rise to problems with unmoulding during injection moulding of the plant pot or during stacking of the plant pots. If, by analogy with the pins 19 and the holes 16, suitable holes (not shown) matching the cross-section of the fingers are provided along the wall 2 in the upper bottom part 13, it will be possible to stack such pots deeper in one another.

Fig. 8 shows a plant pot which is the same as the known plant pot shown in Figures 1 and 2. However, an insert 26 has been placed in the plant pot of Fig. 8, forming a partition 14 and an upper bottom part 13 like those in the pots of Figures 3 and 6. At the underside, the part of the insert 26 forming the partition 14 has openings 27 opposite the inside of the bottom 3 of the pot. Water and air can flow into and out of the substrate material in the interior space 1 through the holes 4 in the bottom 3.

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The insert 26 can be placed loose in the pot, but it can also have hook elements, such as the two hook elements 28 shown by dashed lines, which grip around the edges of holes 4 in the bottom 3.

5 The use of the insert 26 has the advantage over the pots shown in Figures 3 and 6 that it is possible to use existing pots, present in relatively large numbers and therefore relatively cheap, possibly purely from an existing stock, while the advantages of the pots of Figures
10 3 to 7 over the use of the known pot illustrated in Fig. 1 are retained. The good stackability of the known pots, in which they project relatively deeply into one another, is retained with the use of the insert 26 if the inserts 26 are stored outside the pots prior to use of the pots. Since
15 the known pots are designed with such dimensions and are made of such material that the pots themselves are sufficiently strong and resistant to damage, the insert 26 could be made of relatively thin, weak material, such as polythene, which means that the insert can be relatively
20 cheap. For reinforcement, the insert 26 could in that case have a reinforcing edge, such as 29 (shown by dashed lines) along the wall 2.

It is pointed out that use of the plant pot and the insert according to the invention also has advantages in
25 the case of use of the plant pot or of a known plant pot with the insert on an irrigation mat. The plants will then be less likely to root in the mat, while the water from the mat can still be absorbed well in the substrate material in the pot 1.

30 Since for a number of plant varieties the use of the plant pot 2 or the insert 26 according to the invention prevents the formation of roots below the upper bottom part 13, it can be permitted for those plants placing the pot in a dish or the like containing water up to maximum the flood
35 level h. In that case the disc 17 shown in Fig. 5 can have a raised edge 30, shown by dashed lines in Fig. 5, along its periphery.

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Claims

1. Plant pot with an interior space (1) bounded by an upright wall (2) and a bottom (3, 12, 13), intended for the accommodation therein of substrate material (8) for a plant (9, 10), in which a lower part of the pot containing the
5 bottom is shaped and provided with holes (4, 6, 21, 27) below a height (h) which corresponds to a maximum irrigation level of a water irrigation system after the pot is placed on a floor (7), in such a way that the holes can allow air and water to pass between the interior space and
10 the space surrounding the pot, characterized in that the bottom of the interior space comprises an upper part (13) which extends along the wall (2) and above the maximum irrigation level (h), and in that a partition (14) which is suitable for essentially holding back the substrate
15 material (8) extends between the upper bottom part (13) and a lower bottom part (3, 12).
2. Plant pot according to claim 1, characterized in that the upper bottom part (13) has a raised part (15) at a distance from the wall (2) above it.
- 20 3. Plant pot according to claim 2, characterized in that the raised part is a flange (15) forming a continuation of the partition.
4. Plant pot according to claim 1, 2 or 3, characterized in that the upper bottom part (13) has holes (16),
25 and the lower part of the pot is shaped in such a way that the holes (4, 6, 16, 21) can allow air through between the interior space (1) and the space surrounding the pot.
5. Plant pot according to one of the preceding claims, characterized by supporting means (19, 20) disposed below
30 the upper bottom part (13) and extending downwards to at least the level of the underside of the lower bottom part (3, 12).
6. Plant pot according to claim 5, characterized in that the supporting means consist of a wall (20)
35 surrounding the partition (14) and having openings (21) opposite the floor (7).

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7. Plant pot according to claim 5 or 6, characterized in that the supporting means (20) have holes (22) above the maximum irrigation level.
8. Plant pot according to claims 4 and 5, characterized in that the supporting means consist of pins (19), the axes of which intersect a circle on which the holes (16) of the upper bottom part (13) are centred, the cross-section of the pins (19) being smaller than the cross-section of said holes (16), and the number of pins (19) and their positions being such that when two pots are stacked the pins (19) of the upper pot project through a number of said holes (16) of the lower pot.
9. Plant pot according to claim 5, characterized in that the supporting means consist of strip-shaped elements in line with the wall (2) present above the upper bottom part (13).
10. Plant pot according to one of claims 1 to 9, characterized by supporting means (17) extending essentially radially from the partition (14).
11. Plant pot according to claim 10, characterized in that the supporting means extending essentially radially from the partition (14) consist of a disc (17).
12. Plant pot according to claim 12, characterized in that the disc (17) has a raised edge (30) around the partition (14), so that the disc (17) and the edge (30) form an essentially watertight dish.
13. Plant pot according to one of claims 5 to 12, characterized in that the supporting means (17) can be connected to the pot.
14. Plant pot according to one of claims 1 to 4, characterized in that the upper bottom part (13) and the partition (14) of the interior space (1) are formed by an insert (26).
15. Plant pot according to claim 14, characterized in that the insert (26) has openings (27) opposite the lower bottom part (3) of the pot.
16. Plant pot according to claim 14 or 15, characterized in that the insert (26) can be connected to the pot.

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17. Insert (26) according to one of claims 14 to 16.

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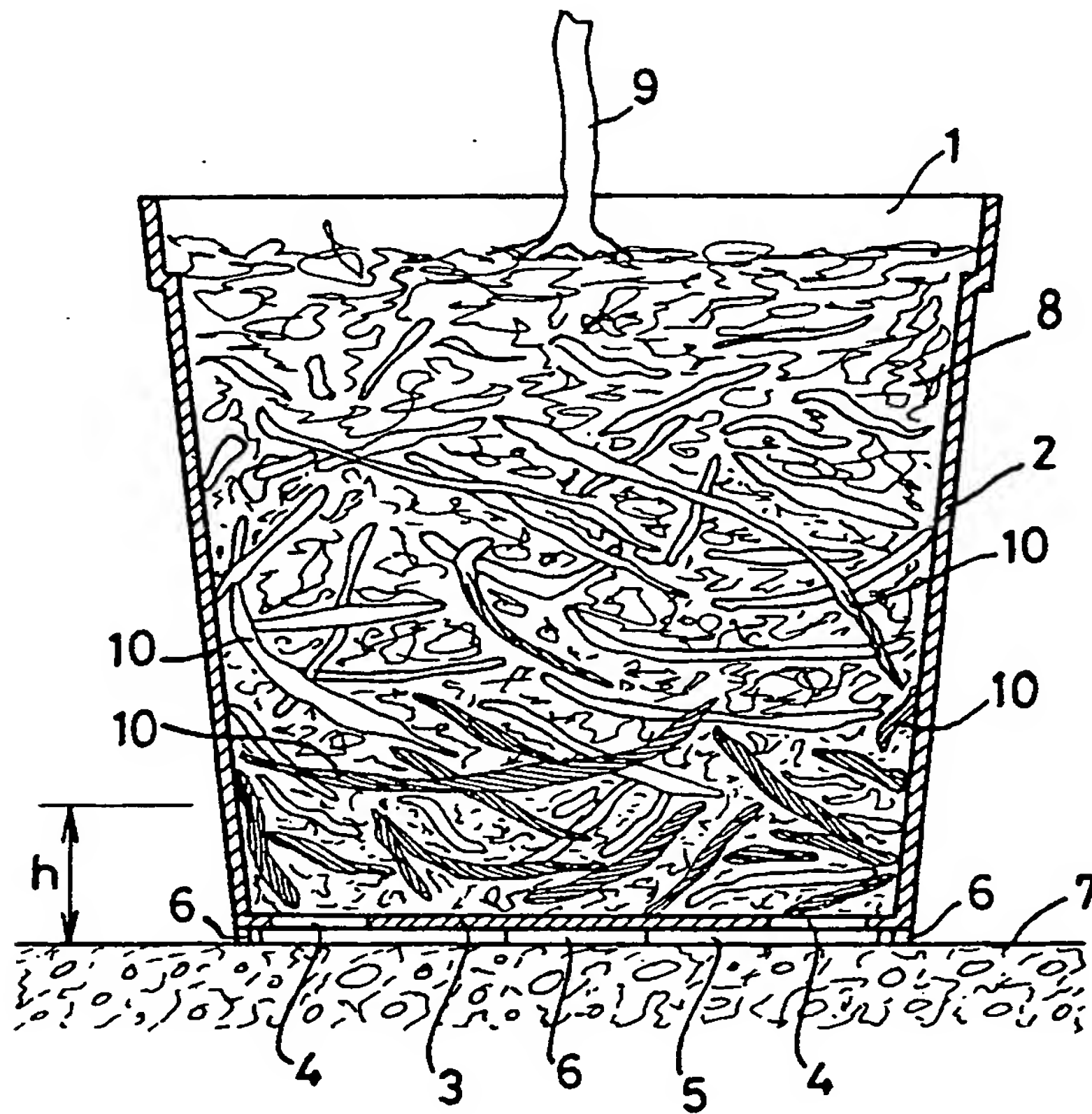


FIG. 1.

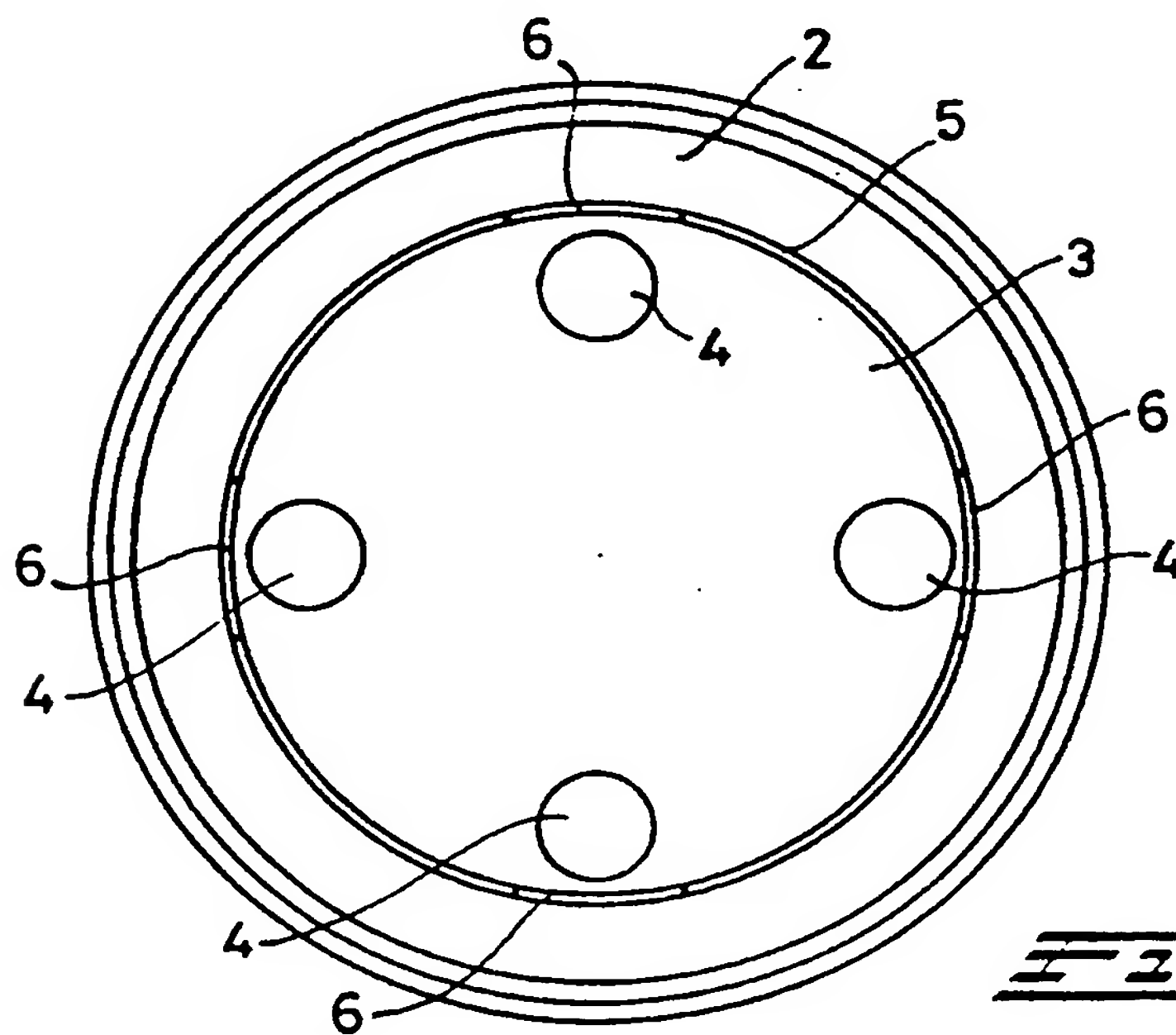
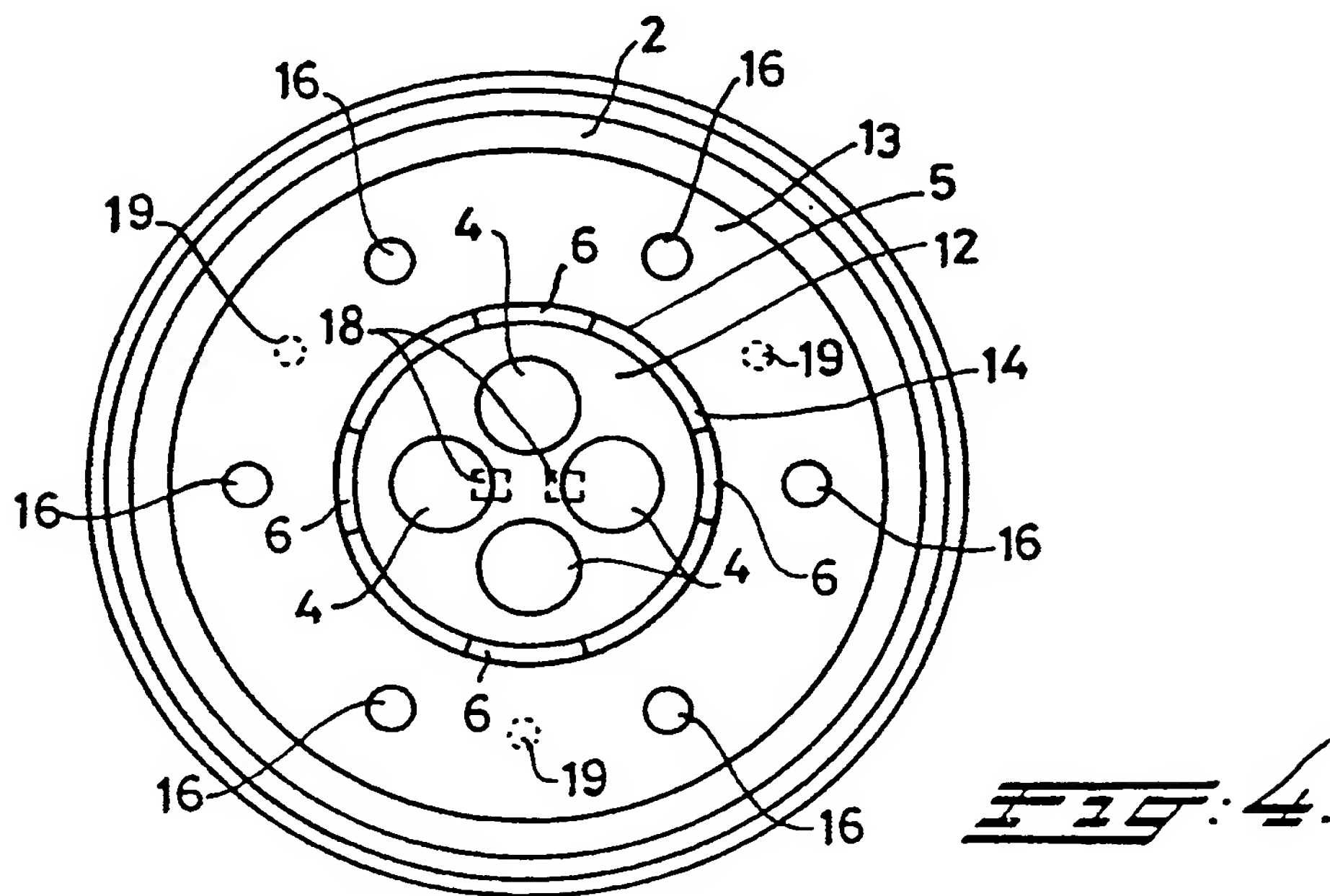
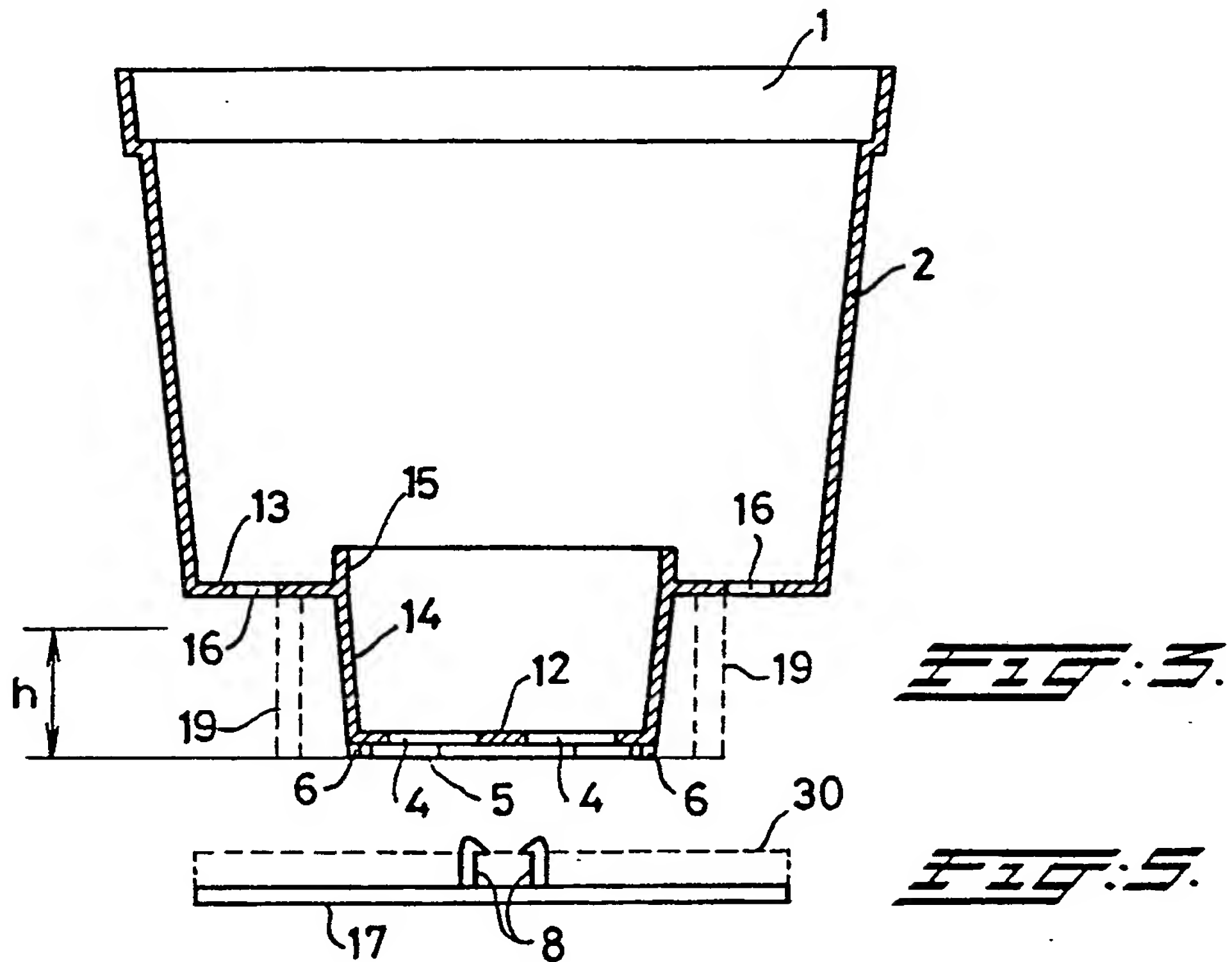


FIG. 2.

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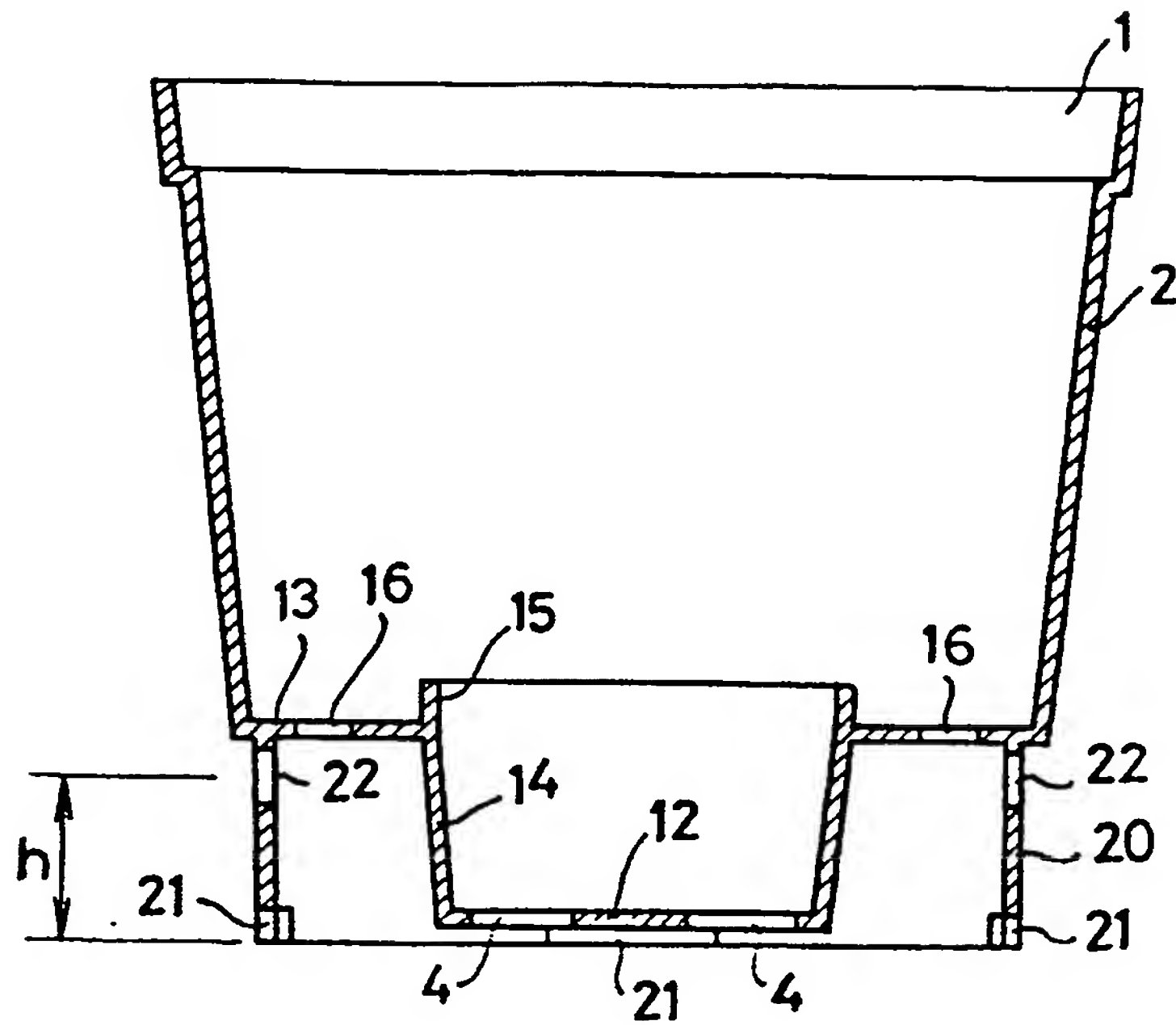


FIG. 6.

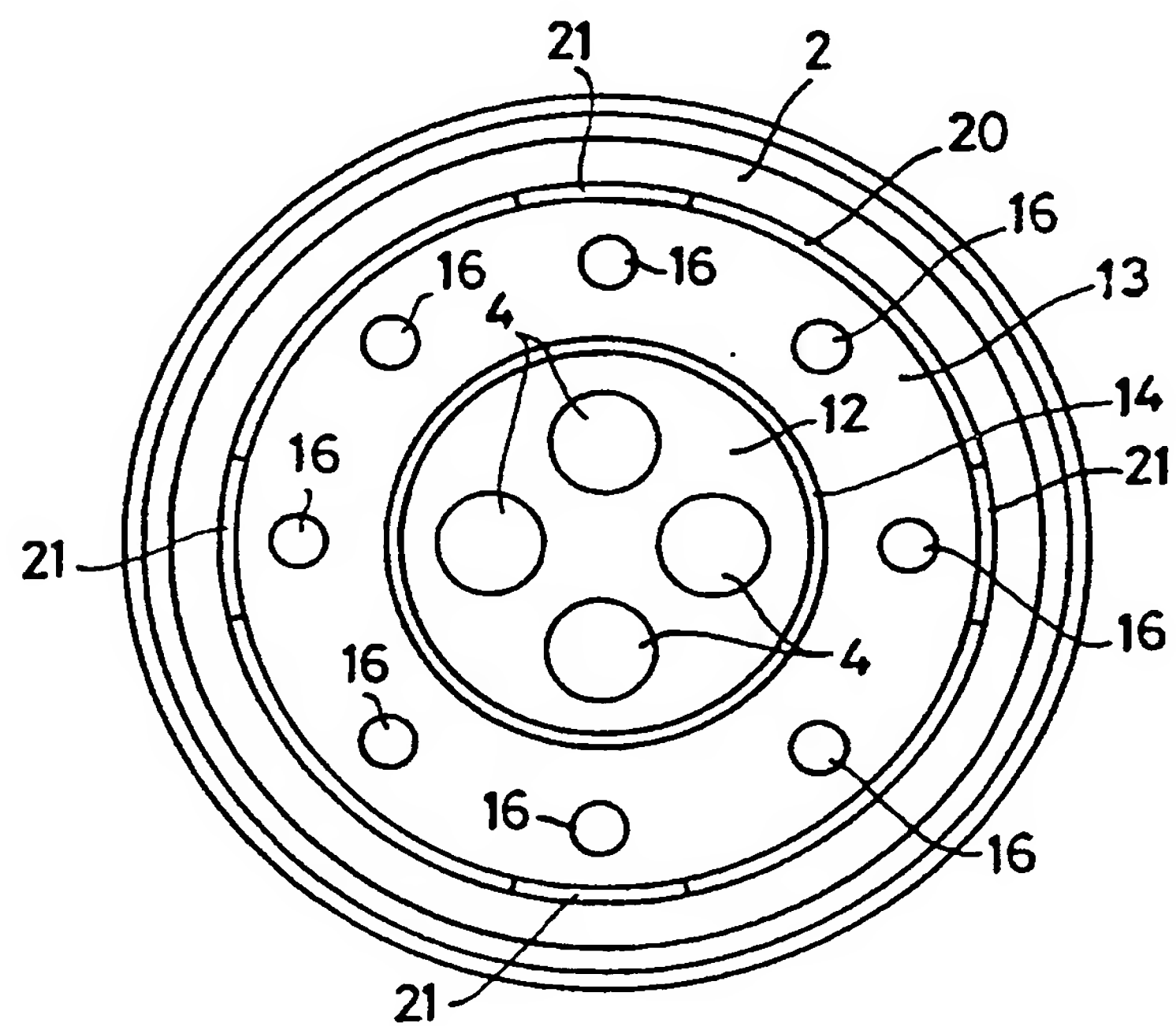


FIG. 7.

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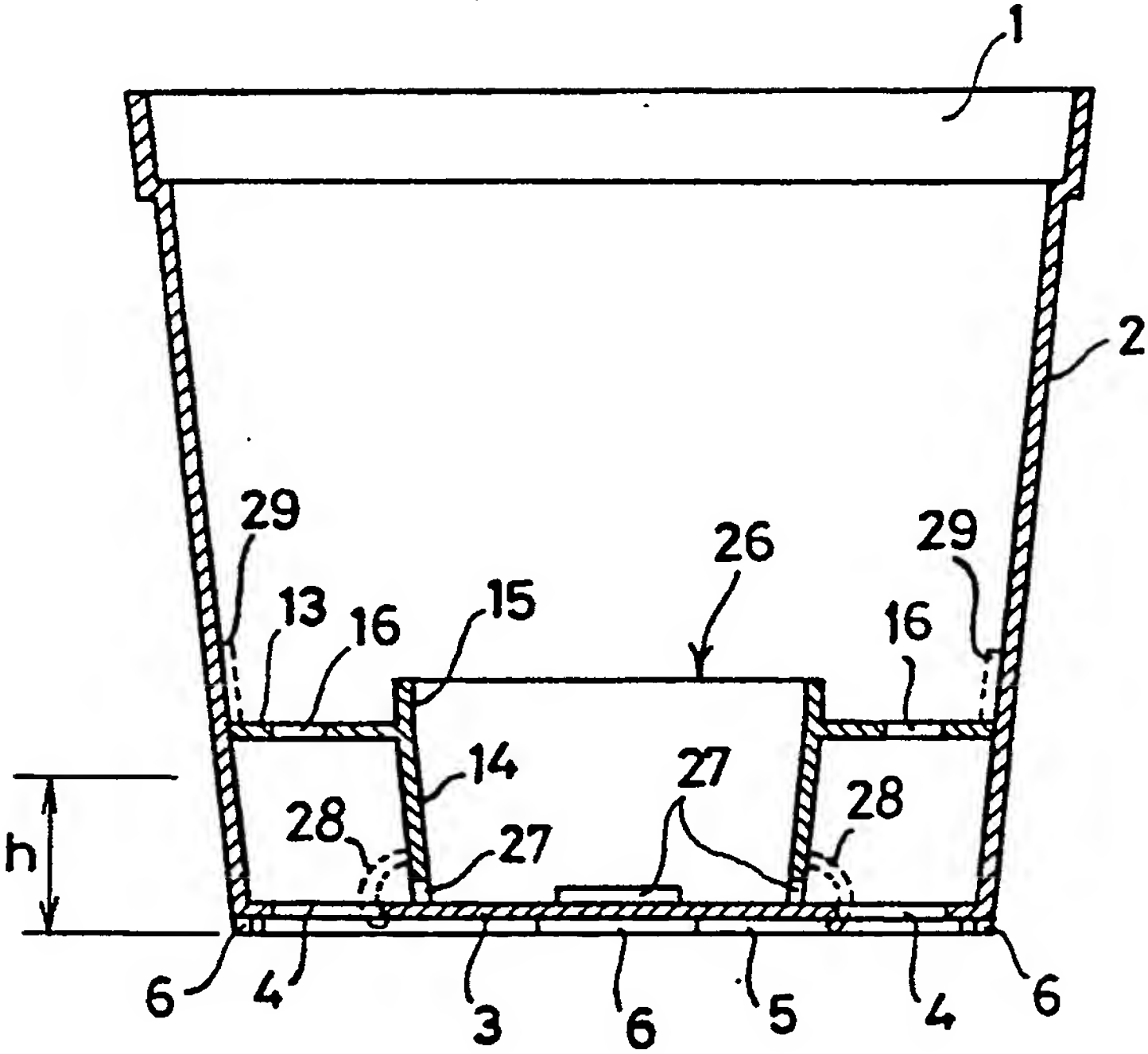


FIG. 8.

INTERNATIONAL SEARCH REPORT

Inter. Application No
PCT/NL 94/00055

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 A01G27/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 A01G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,19 32 110 (ULLRICH) 7 January 1971 see page 9, paragraph 1 - page 11, paragraph 2 see page 16, paragraph 1 - paragraph 3; figures 1-3, 16-18 see page 19, paragraph 1; figure 25 ---	1-7, 13-17
X	US,A,3 949 524 (MICKELSON) 13 April 1976 see the whole document ---	1, 10-13
X	DE,A,34 40 616 (BLATTERT) 7 May 1986 see page 11, last paragraph - page 12, last paragraph see page 14, last paragraph - page 15, paragraph 1; figures 1-3, 5 ---	1-4, 10-13
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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22. 06. 94

Name and mailing address of the ISA

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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X	AU-A-35783/78 see the whole document -----	1,4

INTERNATIONAL SEARCH REPORT

information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-1932110	07-01-71	NONE	
US-A-3949524	13-04-76	NONE	
DE-A-3440616	07-05-86	NONE	

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